Computer-Based Lecture Recording and Reproducing Method

<u>Cross Reference</u>

This application claims the benefit of Korean Patent Application No. 2000-18980, filed on April 11, 2000, under 35 U.S.C. § 119, the entirety of which is hereby incorporated by reference.

Background of the invention

<u>Field of the invention</u>

The present invention relates to a computer-based lecture recording and reproducing program and method.

<u>Description of Related Art</u>

A lecture recording and reproducing program should be able to provide various functions that a lecturer desires and display a stroke information written by a lecturer during a lecture on a screen without any display tremble. That is, a stroke information written by a lecturer during a lecture should be able to be properly inputted to be displayed on a screen without any display tremble and should have not any display tremble while students reproduce a lecture file to take part in a lecture. However, a conventional computer-based lecture recording and reproducing program can not exactly display a stroke information written by a lecturer during a lecture on a screen due to a display trembling phenomenon. Also, there is a problem that graphic tools as well as a stroke information written by a lecturer during a lecture is displayed on a screen with a display tremble.

For the foregoing reason, there is a need for a lecture recording and reproducing program and method that can display a stroke information on a screen

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together with graphic tool without any display trembling phenomenon.

SUMMARY OF THE INVENTION

To overcome the problems described above, preferred embodiments of the present invention provide a computer-based lecture recording and reproducing method that can display a stroke information on a screen together with graphic tool without any display trembling phenomenon.

In order to achieve the above object, the preferred embodiments of the present invention provide a computer-based lecture recording and reproducing method using a lecture recording and reproducing program including an information inputting unit for inputting a stroke information during a lecture, a voice inputting unit for inputting a voice information during a lecture, and a voice outputting unit for outputting the reproduced voice information. The method includes recording a lecture including: a) executing the lecture recording and reproducing program to display an initial screen window; b) opening a lecture file for a recording on the window; copying an information of the lecture file to a memory of the computer when a record function is selected; and c) writing a content inputted from the information input unit onto the memory of the computer, displaying a shape of graphic tool when the stroke information stored in the memory is displayed on the window, and storing the stroke information and the voice data in the lecture file, respectively, inputted through the information inputting unit and the voice inputting unit, whereby the lecture is recorded into the lecture file; and reproducing the recorded lecture including: a) opening the lecture file for a reproduction on the window; b) writing all information except the stroke information and the voice data of the information of the lecture file into the

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memory and displaying all information except the stroke information and the voice data of the information of the lecture file on the window, when a reproduction function is selected; and c) writing the stroke information stored in the lecture file into the memory, displaying the stroke information written in the memory on the window, and reproducing the voice stored in the lecture file to be outputted through the voice outputting unit.

The graphic tool is displayed in a pen shape when the stroke information is inputted, and is displayed in an eraser shape when the inputted stroke information is removed. The lecture recording and reproducing program stores an image information for the lecture in the lecture file and displays the image information on the window. The image information includes an information of a captured screen. The image information includes a graphic image file. The lecture file includes a header region, a stroke information region, a draw information region, an image information region, and a voice information region. The draw information and the image information are stored before the recording or when the recording is momentarily paused. The header of the lecture file includes a data and time information, a version information, a recognizer, a comment, a start location of a stroke information, a size of a stroke information, a start location of a draw information, a size of a draw information, a start location of an image information, a size of an image information, a start location of a voice data, a size of a voice information, a resolution information, and a reservation region. The stroke information region of the lecture file stores a stroke record and a point record, the stroke record including the total stroke number, a pen thickness, a pen color, a starting time of a stroke, an ending time of a stroke, a kind of a tool, a background color information, the total number of a point produced in the stroke, and a point information indicating a

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previous stroke and a next stroke, the point record including a time when a point is produced, a point location information, an event information generated during a lecture recording, and a point information indicating a previous point and a next point. The draw information region of the lecture file stores a draw object type including a free line object and a letter object, an object color, a pen type, a pen thickness, a brush style, a location information and a layer information, a free line object including a region information having a starting point and an ending point of the free line, an object ID, an object color, a color before an object is drawn, a pen thickness of the free line, the total point number, a layer information, a location for a first point, a letter object including a location information for a character string to be displayed, a region information, a font information, a size, a color, a background color, a background mode, a layer information, a character string information to be actually displayed. The image information region stores a location for the image to be displayed, an actual size of the image, an image type, a starting location information of respective images in the lecture file when one or more images are used, an image information, a size information of the image file, a starting time for the image to be displayed, a time for the image to be deleted. The lecture recording and reproducing program produces a stroke record whenever an up or a down event occurs by the information inputting unit during the recording, produces an information generated by a movement of the information inputting unit as a point record following the stroke record to be stored in the stroke information region of the lecture file, and stores a time information when the stroke record and the point record are produced during storing the stroke information. The lecture recording and reproducing program reproduces the stroke information and the voice data by using a time information stored in the stroke information region according

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a system timer set during a reproduction operation. The lecture recording and reproducing program reproduces the stroke information by using an information stored in the stroke record and the point record stored in the stroke information region during a reproduction operation.

The preferred embodiment of the present invention provides a method of reproducing a lecture by using a computer including a voice outputting unit for outputting a reproduced voice data and a lecture reproducing program for reproducing a recorded lecture. The method includes executing the lecture recording and reproducing program to open an initial screen window; opening the recorded lecture file on the window; writing all information except a stroke information and a voice data of informations of the lecture file into a memory of the computer and displaying all information except a stroke information and a voice information of informations of the lecture file on the window, when a record function is selected; and outputting a voice stored in the lecture file through the voice data unit while writing a stroke information stored in the lecture file into the memory and displaying the stroke information written in the memory together with a graphic tool shape. The graphic tool shape is a pen shape.

The computer-based lecture recording and reproducing method according to the preferred embodiment of the present invention can display a stroke information and graphic tool on a screen together without any display trembling phenomenon because the stroke information is first written in the memory and thereafter is displayed on the screen. Further, the computer-based lecture recording and reproducing method according to the preferred embodiment of the present invention can reproduce a lecture file in real-time by using the time information stored in the lecture file.

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BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which like reference numerals denote like parts, and in which:

Fig. 1 shows an initial screen of a lecture recording and reproducing program according to a preferred embodiment of the present invention;

Fig. 2 shows a configuration of a menu "file" of the menu bar of Fig. 1;

Fig. 3 shows a configuration of a menu "edit" of the menu bar of Fig. 1;

Fig. 4 shows a configuration of a menu "view" of the menu bar of Fig. 1;

Fig. 5 shows a configuration of a menu "image" of the menu bar of Fig. 1;

Fig. 6 shows a configuration of a menu "lecture" of the menu bar of Fig. 1;

Fig. 7 shows a configuration of a menu "help" of the menu bar of Fig. 1;

Fig. 8 shows a structure of a lecture file stored by a lecture recording and reproducing method of the present invention;

Fig. 9 shows a structure of a stroke record of a stroke information region of the lecture file according to the preferred embodiment of the present invention;

Fig. 10 shows a structure of a point record of the stroke information region of the lecture file according to the preferred embodiment of the present invention;

Fig. 11 shows a structure of a draw information region of the lecture file;

Fig. 12 shows a structure of a free line object portion of the draw information region of the lecture file;

Fig. 13 shows a configuration of a OLE Text Box object portion of the draw information region of the lecture file;

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Fig. 14 shows an image information of the lecture file;

DETAILED DESCRIPTION OF PREFFERED EMBODIMENTS

Reference will now be made in detail to a preferred embodiment of the present invention, example of which is illustrated in the accompanying drawings.

Fig. 1 shows an initial screen of a lecture recording and reproducing program according to the preferred embodiment of the present invention. As shown in Fig. 1, the initial screen includes a menu bar 1, tool bars 2 and 4, a file list 3, and an application bar 5. The menu bar ① includes menus such as "file", "edit", "view", "image", "lecture". The tool bar includes a basic tool bar ② and a draw tool bar ④. The file list ③ includes a file name that is now opened. The status bar ⑤ indicates a help information of respective menus and tools, informations such as a present location of a mouse, a reproduction time, a lecture recording time, etc, and an information regarding a keyboard set state such as "Num Lock", "Caps Lock", etc.

Fig. 2 shows a configuration of the menu "file" of the menu bar of Fig. 1. As shown in Fig. 2, the menu "file" includes menus such as "new lecture file", "open a lecture file", "close", "save as", "open a transcript of lectures", "save a transcript of lectures", "close a transcript of lectures", "lecture file information", "print", "print preview", "print setting", "a list of the latest files", "exit", etc.

Fig. 3 shows a configuration of the menu "edit" of the menu bar of Fig. 1. As shown in Fig. 3, the menu "edit" includes menus such as "undo a drawing execution", "undo a whole drawing", "delete an image", "delete all image", "copy a selected region", "paste", etc.

Fig. 4 shows a configuration of the menu "view" of the menu bar of Fig. 1. As

shown in Fig. 4, the menu "view" includes menus such as "tool bar", "status bar", "drawing tool", "background color setting", etc.

Fig. 5 shows a configuration of the menu "image" of the menu bar of Fig. 1. As shown in Fig. 4, the menu "image" includes menus such as "screen capture", "scanner driving", "open an image", "save as", etc. The menu "screen capture" is one that starts a screen capture program that can capture any program or any screen in the computer. An image can be made using such a screen capture function. The menu "scanner driving" is one that drives a scanner to make an image and provides an automatic scanning function for automatically scanning, for example, an image, even though a user cannot know a usage of a scanner. The menu "importing an image" provides a function that can use various kinds of graphic images as an image.

Fig. 6 shows a configuration of the menu "lecture" of the menu bar of Fig. 1. As shown in Fig. 6, the menu "lecture" includes menus such as "record a lecture", "reproduce a lecture", "a momentary pause", "stop a lecture", "reproduce all lectures", "reproduce a previous lecture", "reproduce a next lecture", "send an e-mail", etc. The menu "send an e-mail" provides a function that transmits a file that is now opened using an e-mail function.

Fig. 7 shows a configuration of the menu "help" of the menu bar of Fig. 1. As shown in Fig. 7, the menu "help" includes menus such as "help", "help item", "program information", etc.

Returning to Fig. 1, the basic tool bar includes file-related tools (10) and lectured-related tools (20). The file-related tools (10) includes tools such as "new lecture file", "open a lecture file", "save a lecture file", " print", "screen capture", "driving a scanner", "open an image", "send an e-mail", etc. The lectured-related

tools(20) includes tools such as "record a lecture", "reproduce a lecture", "stop a lecture", "pause a lecture", "reproduce all lectures", "reproduce a previous lecture", "reproduce a next lecture", "pen thickness set", "highlight pen", "red pen", "green pen", "blue pen", "black pen", "white pen", "eraser".

The drawing tool bar(④) includes tools such as "pen", "blush", "line", "letter input", "eraser", "region selection", "rectangular", "circle", "rectangular", "circle", "line thickness set box", "color selection box", etc.

The status bar (⑤) includes regions (30) to (90). The region (30) indicates an explanation as to what use respective menus and tools have. The region (30) also includes a processing state bar showing a processing state while "record a lecture file" or "open a lecture file" function is carried out, and a slider showing a present location of a lecture that is being reproduced while a lecture is reproduced. The region (40) indicates a present location of a mouse in coordinates and not indicated while a lecture is recorded or reproduced. The region (50) indicates a time period required to reproduce a lecture having a certain time period while a lecture is reproduced. The region (60) indicates a total time period of an already recorded lecture. The region (70) indicates a state of "Caps Lock". The region (80) indicates a state of " Num Lock". The region (90) indicates a state of "Scroll Lock".

When the lecture recording and reproducing program is executed, the initial screen of Fig. 1 is displayed. Then, a lecturer selects the menu "open a lecture file" of the menu bar or the tool " open a lecture file" of the tool bar to open a lecture file having an image information. Thereafter, the tool "record" of the tool bar is selected to record a lecture content. A stroke information written by the lecturer using a mouse, a pen mouse or the like is recorded along with a voice of a lecturer. The lecturer records a

lecture using the tool bar of Fig. 1 during a recording. When a recording is completed, the lecturer selects the tool "stop" of the tool bar to stop a recording. The lecturer selects the menu "save" or "save as" of the menu bar to make a new lecture file.

Fig. 8 shows a structure of a lecture file stored by the lecture recording and reproducing method of the present invention. As shown in Fig. 8, the lecture file includes a header region, a stroke information region, a draw information region, an image region, and a voice data region. The header region includes a date and time information, a version information, a recognizer, a comment, a start location of a stroke information, a size of a stroke information (data amount), a start location of a draw information (a line, letter, a figure, etc), a size of a draw information (data amount), a start location of an image (an image, a clip art, a metafile, etc) information, a size of an image information (data amount), a start location of a voice data, a size of a voice data (data amount), a resolution information, and a reserved region.

The stroke information stores an actual stroke information. The draw information stores an actual draw information. The image information stores an actual image information. The voice data region stores an actual voice data.

Fig. 9 shows a structure of a stroke record of the stroke information region of the lecture file according to the preferred embodiment of the present invention. As shown in Fig. 9, a stroke record of the stroke information region includes a total number, a pen thickness, a pen color, a starting time, an ending time, a tool (pen or eraser), a background color information, a total point number, a reservation region, a next record pointer, and a previous record pointer.

The stroke record is an information that is produced whenever a lecturer moves a mouse upward or downward. The total number stores the total stroke number. The pen

thickness is a pen thickness information of a stroke. The pen color is a pen color of a stroke. The starting time is a time when a stroke is produced. The ending time is a time when a stroke is finished and is consistent with a starting time of a next stroke. The tool represents which of a pen, a highlight pen and an eraser is used as a tool. The total point number is the total number of a point information produced in the stroke. The next record pointer is a pointer that indicates a next stroke record in a double linked list. The previous record pointer is a pointer that indicates a previous stroke record in a doubled linked list.

Fig. 10 shows a structure of a point record of the stroke information region of the lecture file according to the preferred embodiment of the present invention. As shown in Fig. 10, the point record of the stroke information region includes a time, a location information (X, Y), a type, a next record pointer, and a previous record pointer.

The point record is an information that is generated according to a movement of a mouse after a stroke is produced. The time is a time required to produce the point record. The location information (X, Y) is a location information of a mouse. The type is an event information generated during a recording of a lecture and denotes a momentary pause, a scroll, a pen information, etc. The next record pointer is a pointer that indicates a next record in a double linked list. The previous record pointer is a pointer that indicates a previous record in a double linked list.

One stroke record is produced in real-time according to an up or down event of a mouse or a pen mouse during a recording and at the same time, a necessary information is set before it is managed as a linked stroke. In order to store a location information according to a movement of a mouse or a stylus pen and a time information after respective strokes are produced, one point record is produced in real-time, and at

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the same time, a necessary information is produced and configured before it is managed as a double-linked stroke.

Fig. 11 shows a structure of the draw information region of the lecture file. The draw information region includes an object type, a color, a pen type, a pen thickness, a brush style, a location information, a layer information, and a reserved region.

The object type represents a type of a circle, a rectangle, or the like. The color is a color of an object. The pen type is a type of a pen used to draw an object. The pen thickness is a thickness of a pen used to draw an object. The brush style is a brush style used to draw an object. The location information is a location information required to draw an object. The layer information is an order information in which an object is produced and is an information that is required for a function undoing a drawing.

Fig. 12 shows a structure of a free line object portion of the draw information region of the lecture file. The free line object portion of the draw information region includes a region information, an object identification (ID), a color, a previous color, a thickness, a total point number, a layer information, and a pointer.

The region information includes both a starting point of and an ending point of the free line. The color is a color used to draw an object. The previous color is a previous color information used to undo an object. The thickness is a pen thickness of the free line. The total point number is the number of all points. The layer information is an order information in which objects are produced and is an information required for a function undoing a drawing. The pointer is one for a first pointer structure.

Fig. 13 shows a structure of a letter object portion of the draw information region of the lecture file. The letter object portion of the draw information includes a location information, a region information, a font information, a size, a color, a

background information, a background mode, a layer information, and a character string information.

The location information is a location information which a character string is displayed on a screen and is an information for an undo function. The font information is a font information used to display a character string. The size is a size of a letter. The color is a color of a character string. The background color is a background color of a character string. The background mode represents which of a transparent character string and an opaque character string is displayed. The layer information is an order information in which objects are produced and is an information that is required for a function undoing a drawing. The character string information includes a letter information to be actually displayed.

The draw information is an information that is not reproduced in real-time and stores an information made before a recording begins or an information made in a state of a momentary pause during a recording. Therefore, a draw information cannot be added or deleted during a recording.

Fig. 14 shows the image information of the lecture file. The image information includes a location information, an actual size of an image, a size of an image, a location information in the lecture file, an image information, a file size of an image, a starting time, an ending time, and a reserved region.

The location information is a location information which an image is displayed on a screen. The size of the actual image is an actual size information of the image. The size of the image is a changed size of the image when a size of the image is changed. The type is a type of the image. That is, the type is an information to identify an image type such as JPEG, BMP, GIF, DIB, TIF, etc., a metafile, a clip art, etc. Since the

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location information uses one or more images, a starting location in the lecture file for respective lecture files is indicated when the location information is stored in the file. The image information is an image information to be actually displayed. The size of the image is a size information of an image file. The starting time is a time as to when the present image is displayed on a screen. The ending time is a time as when the present image is deleted.

The image information stores an information made before a recording is carried out or an image information in a state of a momentary pause during a recording. Therefore, an image cannot be added or deleted during a recording.

The voice data does not have a specific structure because it is stored in real-time, and stores and reproduces a voice using a voice compression/ reproduction codec.

Hereinafter, a method of recording and reproducing a lecture by the lecture recording and reproducing program of the present invention is explained in detail with reference to Figs. 15 and 16.

Before recording or reproducing a lecture using a computer, the lecture recording and reproducing program is first executed, so that the initial screen window of Fig. 1 is displayed. A microphone for a voice input is connected to a microphone input terminal of a sound card embodied in the computer, and a mouse, a pen mouse or the like is connected for a signal input.

Fig. 15 is a flow chart illustrating a method of recording a lecture according to the preferred embodiment of the present invention. The lecture recording and reproducing program is executed, so that the initial screen window of Fig. 1 is displayed (step 100). A lecture file including an image information prepared in advance is displayed on the initial screen window (step 110). As an image information used, as

described above, an information read by the scanner, an information of a content of the screen captured and various graphic files may be used. When the menu or the tool "record" is selected, an information displayed on the window is copied to a memory of the computer (step 120). A content inputted from the mouse is stored in the memory of the computer, and a pen shape is displayed together with a stroke information stored in the memory, and a voice inputted from the microphone is recorded in real-time (step 130). It is discriminated whether a stop function of either of the menu bar and the tool bar is selected or not (step 140). If the stop function is not selected, an operation of the step 130 is continuously performed. If the stop function is selected, a recording is stopped (stop 150). In the step 130, the stroke information produced according to an up or down events of a mouse and the point information produced according to a movement of the mouse are stored in the stroke information region of the computer. Also, when the mouse moves, a pen shape is written in the memory by the program, and the pen shape written in the memory is copied onto the screen. As a result, since all information of the lecture file are first written in the memory, and then the information written in the memory are displayed on the screen, a display trembling phenomenon can be overcome.

Fig. 16 is a flow chart illustrating a method of reproducing a lecture according to the preferred embodiment of the present invention. The lecture recording and reproducing program or a suitable program for use solely in reproduction of a lecture file (not shown) is executed, so that the initial screen window of Fig. 1 is displayed (step 200). A lecture file to be reproduced is displayed on the initial screen window (step 210). When the menu or the tool "reproduce" is selected, all information except the stroke information and the voice data of the information of the lecture file are

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written into the memory of the computer and are displayed on the window (220). The voice stored in the lecture file is reproduced while writing the stroke information stored in the lecture file into the memory of the computer and displaying the stroke information written in the memory on the window together with the pen shape (step 230). At this point, when the menu or the tool "reproduce" is selected, a system timer is set, and the stroke information is displayed using the time information stored in the stroke information region of the lecture file according to the system timer, and the voice data is reproduced at the same time as the stroke information. Also, the stroke information is displayed on the window by the stroke and the point information generated according the up or down event of and a movement of a mouse during a recording according to the system timer. Thereafter, it is discriminated whether a stop function is selected or not (step 240). If the stop function is not selected, an operation of the step 230 is continuously performed. If the stop function is selected, a reproducing is stopped (stop 250). As a result, since all information of the lecture file are written in the memory and then are displayed on the window even during a reproduction, a display trembling phenomenon can be overcome.

As described herein before, the computer-based lecture recording and reproducing method according to the preferred embodiment of the present invention can display a stroke information and graphic tool on a screen together without any display trembling phenomenon because the stroke information is first written in the memory and thereafter is displayed on the screen. Further, the computer-based lecture recording and reproducing method according to the preferred embodiment of the present invention can reproduce a lecture file in real-time by using the time information stored in the lecture file.

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While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.